REMARKS

Claims 1-9, and 12-18 are now pending in the application. Claims 10, 11, and 19-29 have been cancelled. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-18 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

The Examiner alleges that although the claims imply how the cooling roll is used, the claims do not clearly and explicitly recite how the cooling roll is used. Claim 1, therefore, has been amended to clearly recite how the cooling roll is used.

Claims 3, 5, and 6 are rejected because "around room temperature" is indefinite. Claims 3, 5, and 6 have been amended to delete "around".

Therefore, reconsideration and withdrawal of this rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 101

Claims 1-18 stand rejected under 35 U.S.C. § 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. § 101.

Claim 1 has been amended to properly define the process associated with the method of manufacturing a magnetic material. More specifically, claim 1 has been amended to define a method that comprises a step of colliding a molten alloy to a circumferential surface of a cooling

roll, a step of producing a ribbon-shaped magnetic material, and a step expelling gas contained between the circumferential surface of the cooling roll and a puddle of the molten alloy. As such, Applicants respectfully assert that claim 1, as amended, is now a proper process claim under 35 U.S.C. § 101, and therefore, the outstanding rejection should now be rendered moot.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Croat (U.S. Pat. No. 4,851,058). This rejection is respectfully traversed.

The Examiner alleges that Croat teaches a method of making a magnetic material having a composition that overlaps the alloy composition recited in the claims and that Croat's method comprises colliding a molten alloy to a circumferential surface of a cooling roll so as to cool and solidify it. Furthermore, the Examiner alleges that although Croat does not teach the presence of gas expelling means, one skilled in the art would have considered the claimed invention to be obvious because it is well settled that where the prior art teaches the process sought to be patented, a difference in structure of the apparatus used to carry out the process, or any of its steps, cannot be considered as a patentable limitation.

Applicants respectfully assert, however, that Croat contains no suggestion or motivation to utilize a method for manufacturing a magnetic material that comprises a step of expelling gas entered between the circumferential surface of the cooling roll and a puddle of the molten alloy, wherein gas expelling means on a circumferential surface of the cooling roll are defined by at least one groove with an average width of 0.5 – 90 μm. Furthermore, Croat contains no suggestion or motivation to utilize a method that includes preventing the molten alloy from entering the grooves of the cooling roll.

The claimed grooves expel gas entered between the circumferential surface and a puddle of the molten alloy. Expelling the gas between the cooling roll surface and puddle of the molten alloy enables reliable contact between the molten alloy and circumferential surface of the cooling roll. Such reliable contact provides uniform cooling of the molten alloy and prevents dimples from forming in the cooled alloy which may cause a magnet to be produced with insufficient magnetic properties. As Croat contains no suggestion or motivation to utilize such a method, the claimed method is not obvious.

Claims 1-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukuno et al (U.S. Pat. No. 5,665,177). This rejection is respectfully traversed.

The Examiner alleges that Fukuno et al teaches a method of making rare-earth-iron-boron permanent alloy powder by ejecting a melt of the alloy against a cooling roll, wherein the cooling roll has grooves with a pitch of 100 to 700 μm to form a ribbon is ground to a particle size of 30 to 700 μm. The Examiner also alleges that the grooves have an average depth of 1 to 50 μm and that the roll in Fukuno's process is a base roll with an outer surface layer having a thermal conductivity that is less than that of the base roll and in which the grooves are formed.

However, as was stated above in the rebuttal of the rejection under Croat, Fukuno et al is also completely silent with respect to a method of manufacturing a magnetic material that includes expelling gas entered between the circumferential surface of the cooling roll and a puddle of the molten alloy, wherein gas expelling means on a circumferential surface of the cooling roll defined by at least one groove with an average width of 0.5 – 90 μm prevent the molten alloy from entering the at least one groove. This width provides a cooling roll that expels gas entered between the circumferential surface and a puddle of the molten alloy. Critically, this width also prevents the molten alloy from entering into the groove. Expelling the gas enables

reliable contact between the molten alloy and circumferential surface of the cooling roll. Such reliable contact provides uniform cooling of the molten alloy and prevents dimples from forming in the cooled alloy which may cause a magnet to be produced with insufficient magnetic properties.

In contrast, Fukuno et al in column 5, lines 56-67, teaches that the molten alloy should enter the grooves. "The grooves extend circumferentially in the circumferential surface thereof. The distance Di between two adjacent ones of the grooves at least in a region with which the molten alloy comes in contact is 100 to 300 μm on average in an arbitrary cross section containing an axis of the chill roll (as shown in FIG. 1, the distance between two adjacent grooves is measured with respect to corresponding portions of the adjacent grooves). If the average distance Di is less than the range, the molten alloy enters the groove with difficulty so that the molten alloy might not be uniformly cooled, and the roll becomes less effective for controlling a variation of cooling rate." (emphasis added) By teaching that the molten alloy should enter the grooves, Fukuno et al directly teaches away from the claimed method, and therefore, the claimed method is not obvious. As such, reconsideration and withdrawal of this rejection is respectfully requested.

DOUBLE-PATENTING

Claims 1 to 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 to 18 of copending Application No. 09/871,592.

Applicant elects to defer the filing of a terminal disclaimer until the Examiner has considered the claims, as amended.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: Dec 6, 2002

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ATTACHMENT FOR CLAIM AMENDMENTS

The following is a marked up version of each amended claim in which underlines indicates insertions and strike-throughs indicate deletions.

1. (Amended) A method of manufacturing a magnetic material comprising:

~~in which a molten alloy is collided~~ colliding a molten alloy to a circumferential surface of a cooling roll to ~~be cooled~~ cool and then ~~solidified~~ solidify the molten alloy; and

~~to produce~~ producing a ribbon-shaped magnetic material having an alloy composition represented by the formula of $R_x(Fe_{1-y}Co_y)_{100-x-z}B_z$ (where R is at least one rare-earth element, X is 10 - 15 at%, y is 0 - 0.30, and z is 4 - 10 at%)~~, wherein the method is characterized by use of a cooling roll having gas expelling means provided in a circumferential surface of the cooling roll for~~; and

expelling gas entered between the circumferential surface of the cooling roll and a puddle of the molten alloy, wherein gas expelling means on the circumferential surface of the cooling roll are defined by at least one groove with an average width of 0.5 – 90 μm prevent the molten alloy from entering the at least one groove.

3. (Amended) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity lower than the heat conductivity of the structural material of the roll base at ~~or around a~~ room temperature.

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5. (Amended) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a heat conductivity equal to or less than 80 $Wm^{-1}K^{-1}$ at ~~or around a~~ room temperature.

6. (Amended) The method as claimed in claim 2, wherein the outer surface layer of the cooling roll is formed of a material having a coefficient of thermal expansion in the range of 3.5 -18 [$x10^{-6}K^{-1}$] at ~~or around a~~ room temperature.

12. (Amended) The method as claimed in claim 1 ~~10~~, wherein the average depth of the groove is 0.5 -20 μm.

13. (Amended) The method as claimed in claim 1 ~~10~~, wherein the angle defined by the longitudinal direction of the groove and the rotational direction of the cooling roll is equal to or less than 30 degrees.

14. (Amended) The method as claimed in claim 1 ~~10~~, wherein the groove is formed spirally with respect to the rotation axis of the cooling roll.

15. (Amended) The method as claimed in claim 1 ~~10~~, wherein the at least one groove includes a plurality of grooves which are arranged in parallel with each other through an average pitch of 0.5 – 100 μm.

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16. (Amended) The method as claimed in claim 1 ~~10~~, wherein the groove has openings located at the peripheral edges of the circumferential surface.

17. (Amended) The method as claimed in claim 1 ~~10~~, wherein the ratio of the projected area of the groove or grooves with respect to the projected area of the circumferential surface is 10 - 99.5%.

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